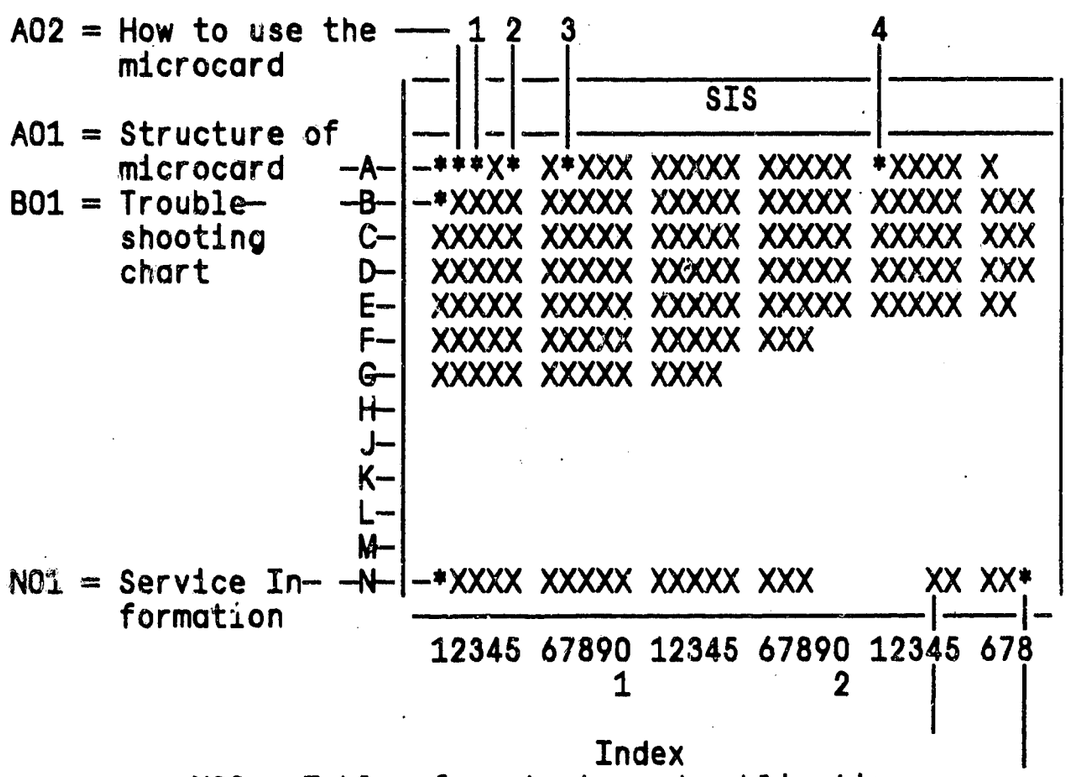
STRUCTURE OF THE MICROCARD (BASIC INSTRUCTIONS)

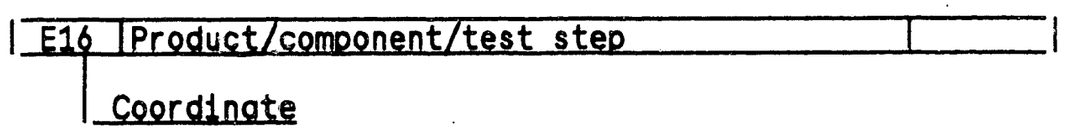


N28 = Table of contents and publication information

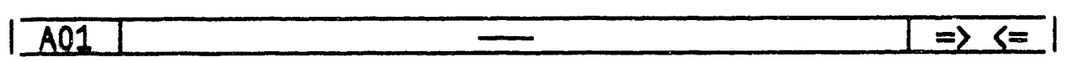
1 = Special features
2 = Safety and precautionary measures
3 = Test equipment and tools
4 = Installation position of components

a. Read from left to right.

b. Title of micropicture (appears on each coordinate).



c. Limits of section



HOW TO USE THE MICROCARD

Trouble-shooting instructions for

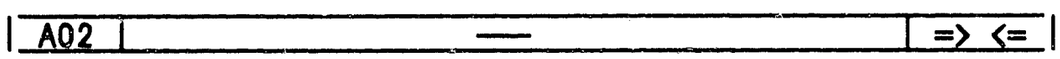
System: Airbag 2

Descriptions, photos, terminal designations and special features refer to the following vehicle:

Volvo 740 10.86->

These basic instructions are detailed trouble-shooting instructions. They must not be used as vehicle-specific instructions.
Caution! Descriptions and photos may deviate from the vehicle-specific brief instructions.

Binding set values, terminal assignments and special features must be taken only from the vehicle-specific brief instructions.
For brief instructions, see table-of-contents microcard KFZ-00..



SPECIAL FEATURES

The airbag triggering device is equipped with self-diagnosis. If a fault arises in the system, this fault is stored in the fault memory. At the same time, the SRS/RS warning lamp (warning/diagnostic lamp) lights up in the instrument panel.

In addition, the time at which the fault arises and the characteristics of the crash are stored in the fault memory.
In the case of court action for damages, these data may be called up by the vehicle manufacturer using a tester.

The test covers only the electrical components of the system.
The mechanical components (airbag and seat-belt tightener units) cannot be tested without being destroyed.

SAFETY AND PRECAUTIONARY MEASURES

1. Reversal of the polarity of the voltage supply, e.g. through incorrect connection of the battery, may lead to the destruction of the triggering device.

2. Do not use a fast charger for starting the engine.
   Provide starting assistance using only a second 12 V battery and jump leads.
   Caution! Due to differing demands made by vehicle manufacturers on electronic products, we recommend that you do not use a 24 V battery for providing starting assistance. Observe the operating instructions of the vehicle.

3. Disconnect the battery from the vehicle electrical system for boost charging.

4. When charging the battery in the vehicle or providing starting assistance, observe the information in the operating instructions of the fast charger and the information given by the vehicle manufacturer.

5. After an accident, the individual components must be replaced if the following circumstances apply:
   -Noticeable deformation or damage to the housing (triggering device, power stand-by and voltage converter).
   -Deformation of the triggering-device console (even if the triggering device is outwardly intact).
   -Airbag or seat-belt tightener units which have not been triggered but are damaged.
   -Airbag or seat-belt-tightener units which have been triggered.

   Note: damaged or defective components of the system must not be repaired, but must always be replaced.

6. Airbag and seat-belt-tightener units which have dropped from a height of more than 0.5 m must no longer be installed into vehicles.
The airbag and seat-belt-tightener units must also not be subjected even for a short time to temperatures exceeding 100 °C.

7. The airbag and seat-belt-tightener units must not be treated with grease, cleansing agents or the similar.

9. Airbag and seat-belt-tightener units must be transported only in transport containers which have been officially passed for this purpose.
It is forbidden to transport airbag and seat-belt-tightener units in the passenger compartment.
Caution:
The firing pellet and solid propellant of the airbag and seat-belt-tightener unit are hazardous goods in the sense of the Hazardous Goods on the Road Ordinance (GGVS), Category 1b, Subsection 7.
When transporting more than 50 kg, the following must take place:
- an entry must be made in the transportation documents
- accident instruction sheets added to the documents
- warning signs secured to the vehicle.

Transportation by air freight only after further inquiry with the air carrier.

10. The storage of airbag and seat-belt-tightener units must be conducted in accordance with the Second Ordinance to the Explosives Act (West Germany) of November 23, 1977.
In accordance with this ordinance, small amounts of explosives and explosive objects are permitted to be stored in lockable areas without special storage authorization in accordance wth the Explosives Act.
Pyrotechnique objects of Class T 1 are permitted to be stored only in limited quantity in a commercially

used building.
Permissible storage quantities:
5 airbag and
4 seat-belt-tightener units.

This maximum storage quantity must under no circumstances be exceeded.

11. The airbag and seat-belt-tightener units must be assembled in the vehicle immediately and without delay after being removed from the storage area.
If, for any reason, assembly work must be interrupted, the airbag and seat-belt-tightener units must be stored again, locked away.
Caution:
Always store the airbag unit when not installed with the padded side upward!
If the gas generator were to fire with the airbag facing downward, the airbag unit would be catapulted upward (danger of injury). Do not secure the seat-belt-tightener unit to the tensioning cable or to the impeller wheel of the turbine. If the propeller device were to fire, the impeller wheel of the turbine would be accelerated rapidly (danger of injury).

12. When working on the airbag and seat-belt-tightener system or when welding, the following safety measures must always be taken in the sequence specified:
1. Ignition lock to 0 position.
2. Disconnect battery cable from negative terminal. Cover negative terminal.
3. Disconnect yellow quadruple plug-in connection of the triggering device from the wiring harness.

SAFETY AND PRECAUTIONARY MEASURES
(Continued)

13. In order to avoid any problems at the triggering device with regard to electrical contact, the short wiring harness must always be replaced if, for the purpose of trouble-shooting, the 12-pin plug of the triggering device or the 4-pin plug of the power stand-by has been disconnected.

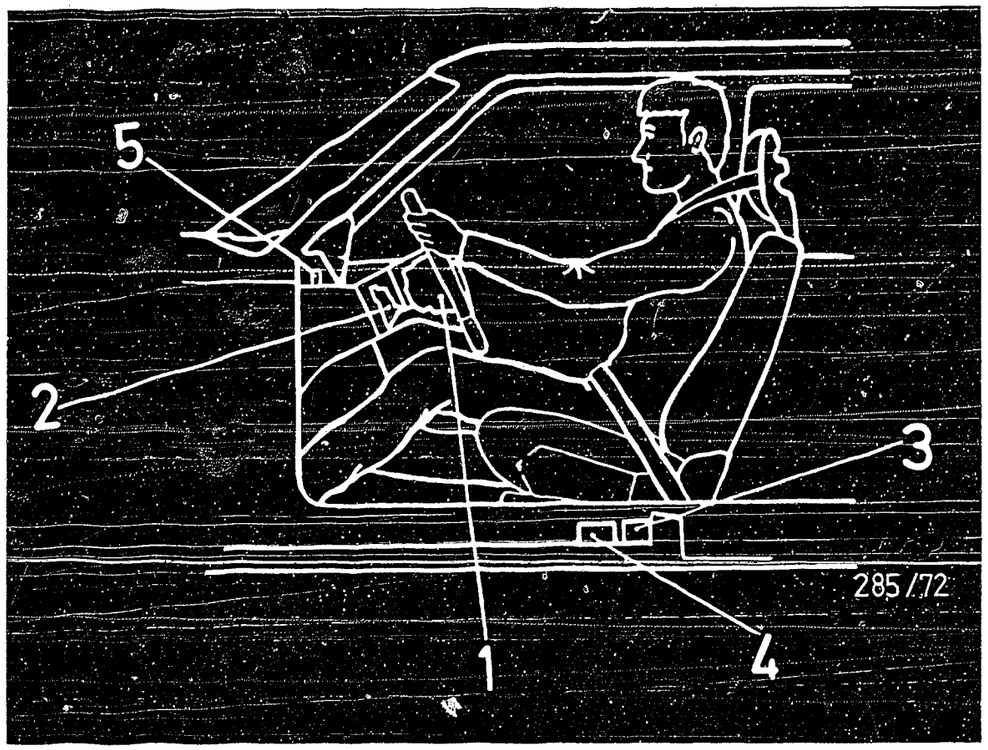
14. When scrapping the system, follow the instructions of the vehicle manufacturer.
Attention:
A mercury switch is fitted in the triggering devices.
Mercury is a highly dangerous water-contaminating substance of Water Contamination Class 3, and for this reason, the triggering devices must be disposed of as special waste.

In order to prevent damage to a control unit and unwanted triggering of the airbag and seat-belt-tightener units, and to keep persons out of danger, always observe the instructions.

TEST EQUIPMENT AND TOOLS

Digital-multimeter or multimeter	e.g. MMD 301 or Fluke 75 or Fluke 23	0 684 500 301 Commercially available

Caution: for testing the system, use only multimeters with current limitation ≤ 20 mA!



1 = Airbag unit
2 = Transmission spring (contact roller)
3 = Triggering device
4 = Power stand-by and voltage converter
5 = SRS/RS warning lamp

INSTALLATION POSITION OF COMPONENTS

For production reasons:
continued on the following
coordinate.

HOW TO USE TROUBLE-SHOOTING CHART AND TROUBLE-SHOOTING PROGRAM

The TROUBLE-SHOOTING CHART starts on coordinate B03 and contains customer complaints (fault symptoms) with several possible causes (component faulsts) in each case as well as coordinate references for detailed trouble-shooting. If no coordinate reference is given, this is a cause for which no test instructions are required.

Components that are checked by the self-diagnosis or with the universal test adapter are not listed in the trouble-shooting chart.

If the customer complaint is clear, proceed with trouble-shooting in the given order of possible causes one after the other and step by step.

Always start trouble-shooting with the self-diagnosis (if applicable) or with the universal test adapter (if provided). Only then continue with the trouble-shooting chart.

If the customer complaint is not clear, check all the causes listed in the trouble-shooting chart. To prevent possible incorrect measurements, check all causes in the order given (owing to the interlinking of test steps).

HOW TO USE TROUBLE-SHOOTING CHART AND TROUBLE-SHOOTING PROGRAM (continued)

The TROUBLE-SHOOTING PROGRAM contains all system and component checks mentioned in the trouble-shooting chart. It is divided into three rows of boxes.

The left-hand column contains test instructions and set values.
The center column contains instructions on trouble-shooting and fault rectification.
The right-hand column contains the illustratrations/terminal diagrams belonging to the text, with explanations.

If the questions in the left-hand column can be answered conclusively with "yes", continue trouble-shooting with the next box down.

If the answer to the question is "no", branch to the center column and carry out the tests in the order given there.
After rectifying a fault repeat the test as a check.

TROUBLE-SHOOTING CHART

Customer complaint (symptoms of trouble)

1. SRS/RS warning lamp lights up constantly
2. SRS/RS warning lamp does not light up when ignition switched on.
3. Interference noise when steering
4. SRS/RS warning lamp lights up intermittently for approx. 10 s. (e.g. after starting)
5. Seat-belt tightener not operating (control unit .. 012 only)

1	2	3	4	5	Cause (component fault)	Coord.
*	*	*	*		Evaluate self-diagnosis	B 5
	*				SRS/RS warning lamp defective	B23
*					Crash stored	A03
		*			Test transmission spring to firing pellet	B25
	*				Test start detection term. 61	B27
*					Fault memory has not been cleared	B09
*	*		*		Test voltage supply	C01
*	*				Test actuating lead to SRS/RS warning lamp	C03

USE OF SELF-DIAGNOSIS, SELF-DIAGNOSIS TEST TABLE, AND SELF-DIAGNOSIS TROUBLE-SHOOTING PROGRAM

The control unit installed in this vehicle incorporates self-diagnosis. For this reason, trouble-shooting must start with self-diagnosis.

Activation of self-diagnosis is described starting on Co-ordinate B05.
The self-diagnosis test table starting on B11 includes:

- Fault indication (flashing code)
- Components or system functions inspected
- Test instructions/conditions
- Connection terminals
- Set-value information
- Co-ordinate information for trouble-shooting and elimination in the subsequent self-diagnosis trouble-shooting program.

USING THE SELF-DIAGNOSIS, SELF-DIAGNOSIS TEST TABLE AND SELF-DIAGNOSIS TROUBLE-SHOOTING PROGRAM (Continued)

The self-diagnosis trouble-shooting program is divided into three columns starting at Coordinate B13.

The left-hand column contains test instructions and set values.

The center column contains information on trouble-shooting and on how to rectify the fault.

The right-hand column contains the illustrations/ terminal diagrams belonging to the text, together with explanations.

If the questions in the left-hand column can be answered conclusively with "yes", continue trouble-shooting with the next box down.

If the answer to the question is "no", branch to the center column and carry out the tests in the order given there.
After rectifying a fault, repeat the test as a check.
If the self-diagnosis indicates a fault, but no system fault or component fault was found during trouble-shooting, try replacing the control unit.

If no more fault is indicated in self-diagnosis and the customer complaint has still not been eliminated (symptom of trouble), continue trouble-shooting with the trouble-shooting chart starting at Coordinate B03.

B05 — <⟹>

For production reasons:
continued on the following coordinate.

B06 — <⟹>

SRS/RS WARNING LAMP
SRS/RS warning lamp in the instrument panel lights up for approx. 10 seconds when the ignition is switched on.

1. SRS/RS warning lamp goes out after approx. 10 seconds when there is no fault present in the electrical system at that moment.

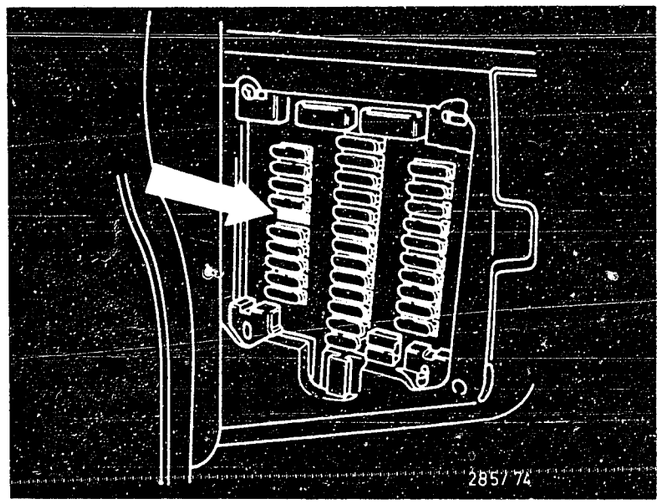
2. SRS/RS warning lamp does not go out or SRS/RS warning lamp lights up constantly or intermittently while driving: evaluate flashing code.

3. SRS/RS warning lamp lights up for at least 9 s. if there is a brief voltage dip < 10 V (no storage of fault).

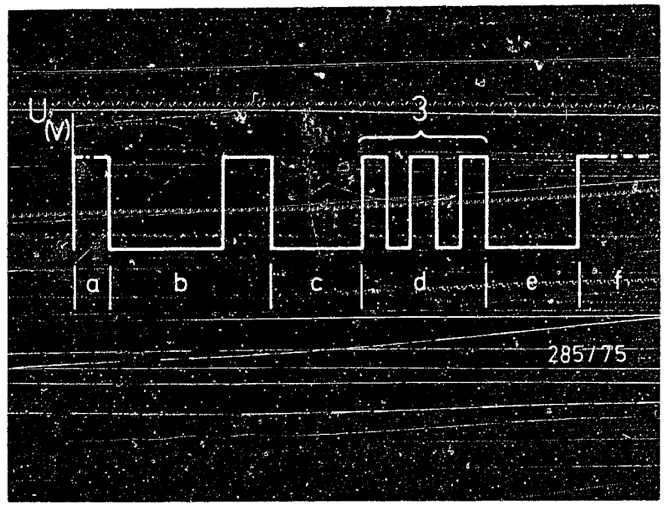
<u>Activating the self-diagnosis:</u>

Switch on ignition and wait for at least 15 s.
Connect stimulus lead (central electrics, upper illustration, arrow) with a fuse (2...5 s.) to ground.
The faults stored in the fault memory (max. of 5 different faults) are output in the form of flashing codes (one after the other).
The first fault is output approx. 4 s. after stimulation.
The fault memory can be read out as often as desired.

<u>Evaluating the flashing code (lower illustration)</u>:
The flashing code for each fault consists of a flashing-pulse block.
Each block represents a number and is comprised of 1 to 10 pulses.
One pulse corresponds to the number 1, ten pulses correspond to the number 10.
With each pulse, the SRS/RS warning lamp lights up briefly.
There is a longer pause between two fault codes than there is between the individual pulses (approx. 4 seconds).
Every output of diagnosis begins after stimulation with a pause of approx. 4 seconds (lower illustration, c).
If no fault is stored in the control unit, the SRS/RS warning lamp remains off. If faults are stored in the control unit, these are then output (lower illustration, d-f).
After the last fault stored in the control unit has been output, the SRS/RS warning lamp continues indicating faults (lower illustration, f) until the fault memory is cleared.



a = SRS/RS warning lamp lights
b = SRS/RS warning lamp off during stimulation
c = Pause before flashing-code output (approx. 4 s)
d = Example of flashing code 3
e = Pause between the flashing codes
f = Next fault is output or SRS/RS warning lamp indicates that faults are stored.



Clearing the fault memory:

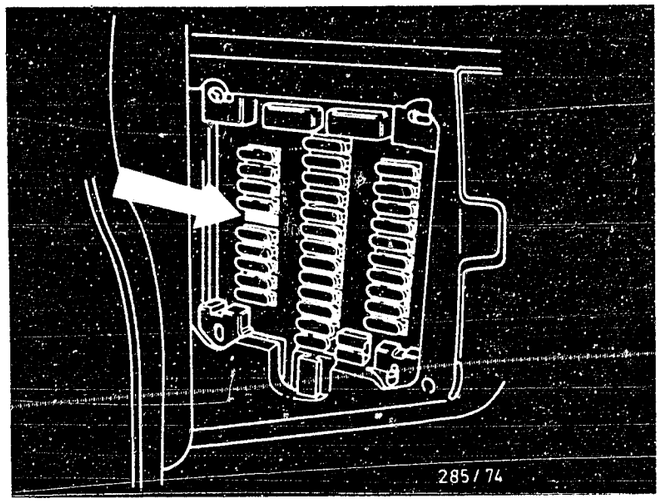
The fault memory can be cleared only if the faults stored have been read out beforehand and the engine has not been started since the fault memory has been read out.

The fault memory is cleared by connecting the stimulus lead (central electrics, upper illustration, arrow) to ground with a fuse, connection being made three times for at least 1,5 seconds and within a period of 5 to 0,25 seconds.

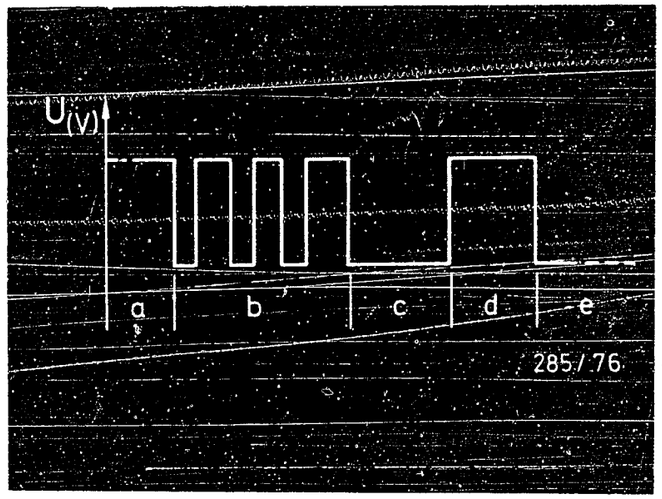
The triggering device indicates clearing of the memory through the SRS/RS warning lamp which lights up for 4 s. (lower illustration, d) 3 s. after initiation of clearing (lower illustration, c). Following this, the SRS/RS warning lamp goes out if no more faults are present in the system (lower illustration, e).

N O T E :

The crash characteristics are cleared when the fault memory is cleared.
Therefore, the fault memory in vehicles with accident damage must not be cleared (due to possible claims for damages).



a = Fault stored
b = Activating clearing
c = Pause before clearing
d = Clearing is indicated
e = Fault memory cleared



SELF-DIAGNOSIS TEST TABLE

Fault indication Flashing code	Component	Cause of trouble	Test instructions	Terminals	Set values	Coord.
1	Firing circuit and triggering device	Short circuit to pos., ground or triggering device defect.	Test cable connections for short circuit (current limitation < 20mA) Replace triggering device.	8 2	See brief instructions	B13
2	Power stand-by Voltage converter	Open circuit or short circuit to ground	Test voltage supply of power stand-by (to do this, disconnect triggering device from wiring harness). Test cable connections for short circuit and open circuit. Replace power stand-by. If fault is not eliminated through installing new power stand-by, replace triggering device.	10 4 5 4	See brief instructions > 10 V	B15
3	SRS/RS warning lamp (warning/diagnostic lamp)	Short circuit to ground or to positive	Test cable connection for short circuit, open circuit and loose contact.	3 4	> 10 V	B17
4	Firing circuit, driver's side	Short circuit	Test cable connections for short circuit and open circuit (plug-in connection of airbag and seat-belt-tightener units must be disconnected). Replace wiring harness. Replace airbag or seat-belt-tightener unit.	8 2	See brief instructions	B19
5		Open circuit				
6,7	Triggering device	Incorrect triggering device installed	Install specified triggering device.	—		B13
8	Firing circuits	Short circuit to positive	Test cable connections for short circuit and open circuit (plugs of airbag and seat-belt-tightener units disconnected).	8 5 2 5 8 4 2 4	> 1 M Ω > 1 M Ω > 1 M Ω > 1 M Ω	B21
9		Short circuit to ground				
10	Triggering device	Mercury switch defective	Replace triggering device. With triggering device (.. 012), test term. 7 for short circuit to ground.	—	——	

Note: For all voltage tests, the triggering device (quadruple plug-in connection) must be disconnected first of all.
Before disconnecting any plug-in connection in the airbag system always switch off the ignition and disconnect the battery!

B11 — ⟹

B12 — ⟸

SELF-DIAGNOSIS TROUBLE-SHOOTING PROGRAM (1)

SELF-DIAGNOSIS FLASHING CODE 1

Testing firing circuit:

Switch off ignition; disconnect battery term. 30.
Disconnect plug from power stand-by and triggering device.
Using ohmmeter at plug, test triggering device term. 2 to term. 8:
(use tester with current limitation < 20 mA!)
Set value:
see brief instructions

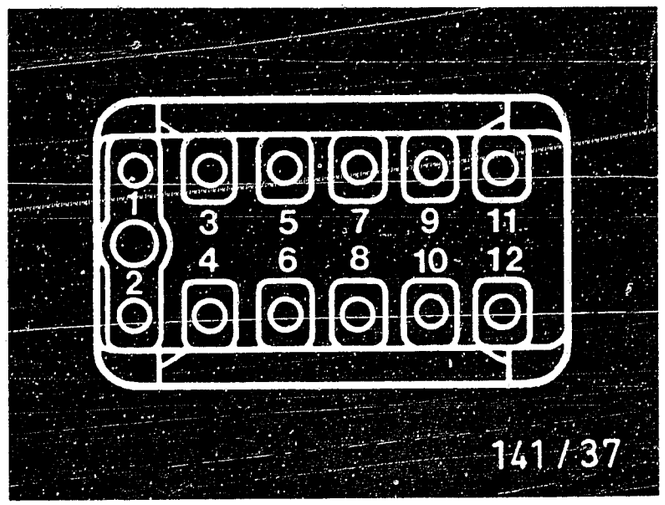
Is set value obtained?

N>

Switch off ignition; disconnect battery term. 30.
Disconnect plug from airbag triggering device (upper illustration).
Using ohmmeter, check leads from airbag-triggering-device plug term. 2 and term. 8 to airbag-unit plug (center illustration) term. 1 and term. 2 for short circuit and open circuit.

Replace airbag unit.

Eliminate contact resistances, open circuits and shorts circuits in the leads.



Y

SELF DIAGNOSIS FLASHING CODE 1
(Continued)
Triggering device defective:

Switch off ignition; disconnect battery term.30.
Disconnect plug from power stand-by and triggering device.
Replace triggering device.

Triggering device replaced?

Y

Return to self-diagnosis test table B11

B13 ⟹

B14 ⟺

SELF-DIAGNOSIS TROUBLE-SHOOTING PROGRAM (2)

SELF-DIAGNOSIS FLASHING CODE 2

Testing power stand-by:

Switch off ignition; disconnect battery term. 30.
Disconnect plug from power stand-by and triggering device.
Reconnect battery term. 30 and switch on ignition. Using voltmeter at plug, check power stand-by term. 2 to term. 4:
Set value:
see brief instructions

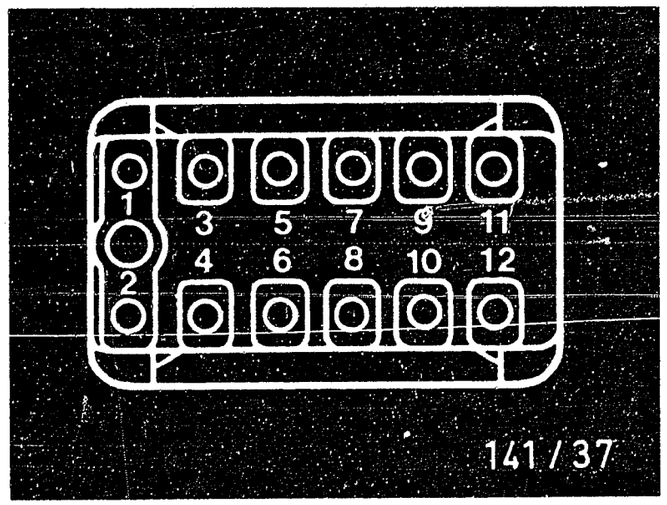
Is set value obtained?

N>

Switch off ignition; disconnect battery term. 30.
Disconnect plug from airbag triggering device (upper illustration).
Using ohmmeter, check leads from airbag-triggering-device plug term. 10 and term. 9 to power-stand-by plug (center illustration) term. 1 and term. 3 for short circuit and open circuit.

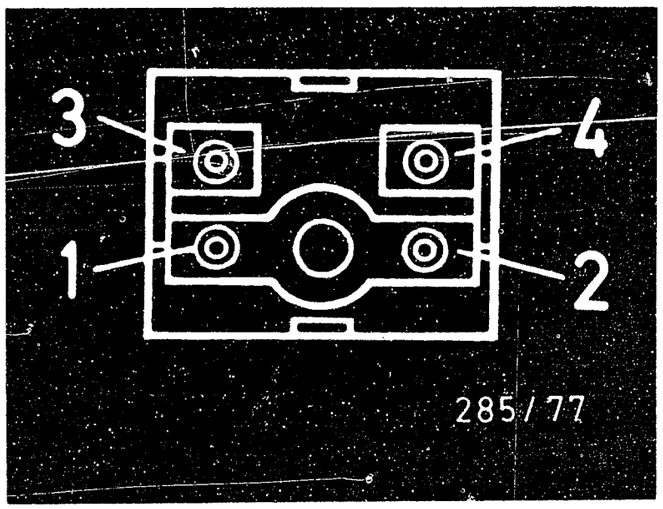
Replace power stand-by.

Eliminate contact resistances, open circuits and short circuits in the leads.



Y

Return to self-diagnosis test table B11



SELF-DIAGNOSIS TROUBLE-SHOOTING PROGRAM (3)

V

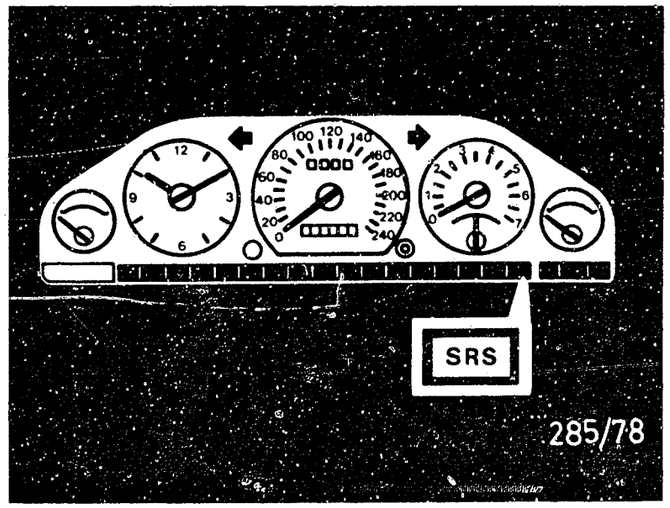
SELF-DIAGNOSIS FLASHING CODE 3

Testing warning and diagnostic lamp (upper illustration):
switch off ignition; disconnect battery term. 31.
Pull apart quadruple plug-in connection (center illustration, arrow).
Reconnect battery term. 31 and switch on ignition.
Warning and diagnostic lamp must light up.

Does warning and diagnostic lamp light up?

N> Testing warning and diagnostic lamp:
Using ohmmeter at quadruple plug-in connection, test term. 4 to term. 3 and term. 2 to term.3:
Set value:
see brief instructions

Is set value obtained?



Y

V

SELF-DIAGNOSIS FLASHING CODE 3 (Continued)

Testing warning and diagnostic lamp:
Using ohmmeter, check lead from quadruple plug-in connection (lower illustration) term. 4 to triggering-device plug term. 3 for short circuit and open circuit:
Set value:
> 1 M Ω

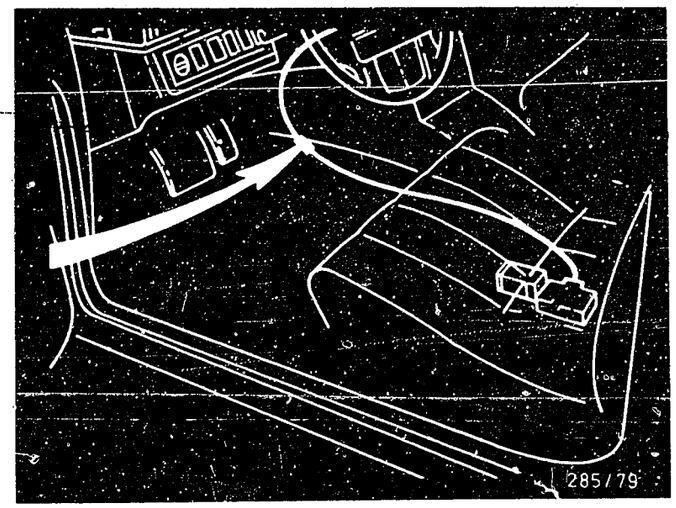
Is set value obtained?

N> Switch off ignition; disconnect battery term. 30.
Disconnect plug from airbag triggering device.

Using ohmmeter, check leads from airbag-triggering-device plug term. 10 and term. 9 to power-stand-by plug (center illustration) term. 1 and term. 3 for short circuit and open circuit.

Replace power stand-by.

Eliminate contact resistances, open circuits and short circuits in the leads.



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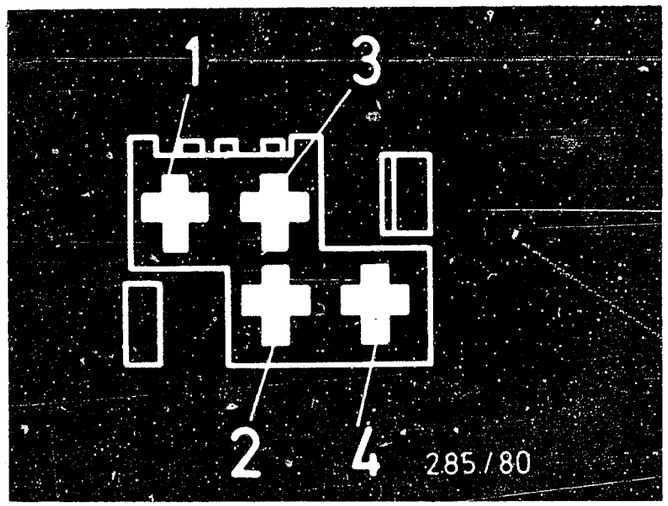
V

Return to self-diagnosis test table B11



SELF-DIAGNOSIS TROUBLE-SHOOTING PROGRAM (4)

V

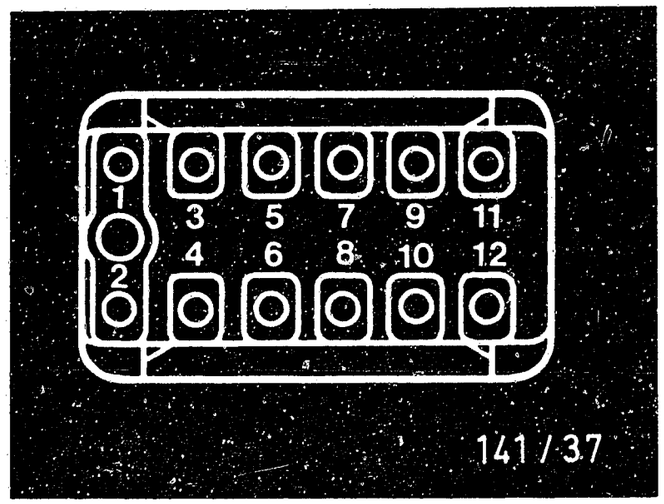
SELF-DIAGNOSIS FLASHING CODE 4/5

Testing firing circuit on driver's side:
Swith off ignition; disconnect battery term. 30.
Disconnect plug from power stand-by and triggering device.
Using ohmmeter and triggering-device plug, test term. 2 to term. 8:
(use tester with current limitation < 20 mA!)
Set value:
see brief instructions

Is set value obtained?

N>

Remove airbag unit (see lower illustration).
Using ohmmeter, check leads from triggering-device plug via winding spring to airbag-unit plug for short circuit and open circuit.
Eliminate short circuit, open circuit and contact resistances.
Replace airbag unit.



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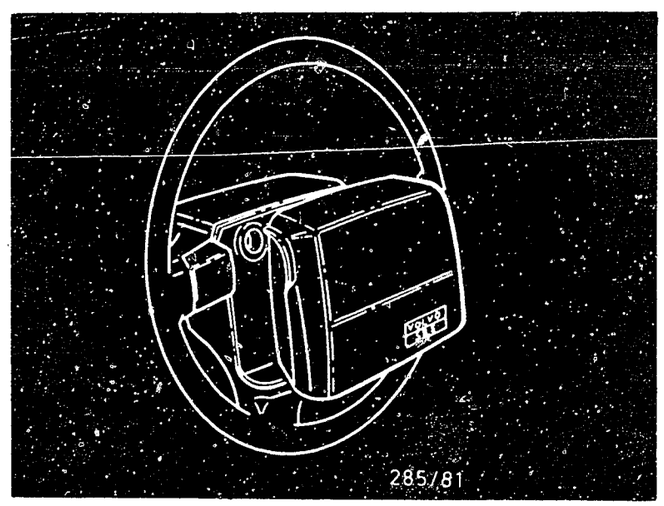
V

Return to self-diagnosis test table B11



SELF-DIAGNOSIS TROUBLE-SHOOTING PROGRAM (5)

SELF-DIAGNOSIS FLASHING CODE 8/9

Testing firing circuits:

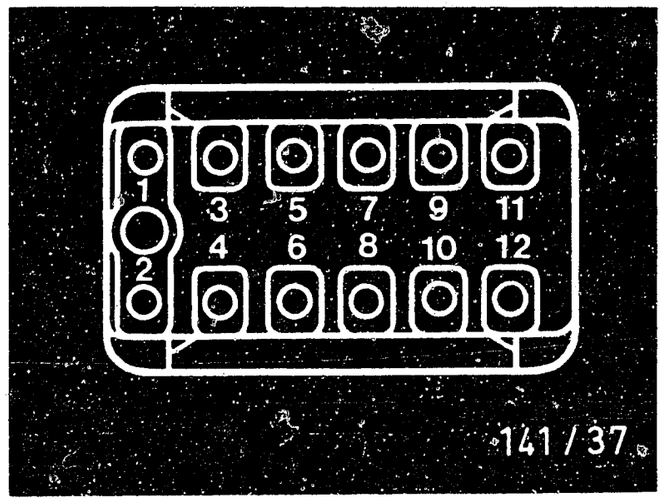
Switch off ignition; disconnect battery term. 30.
Disconnect plug from power stand-by and triggering device.
Using ohmmeter at triggering-device plug, test
term. 2 to term. 5
term. 8 to term. 5
term. 2 to term. 4
term. 8 to term. 4 :
(use tester with current limitation < 20 mA!)
Set value:
see brief instructions

Is set value obtained?

N>

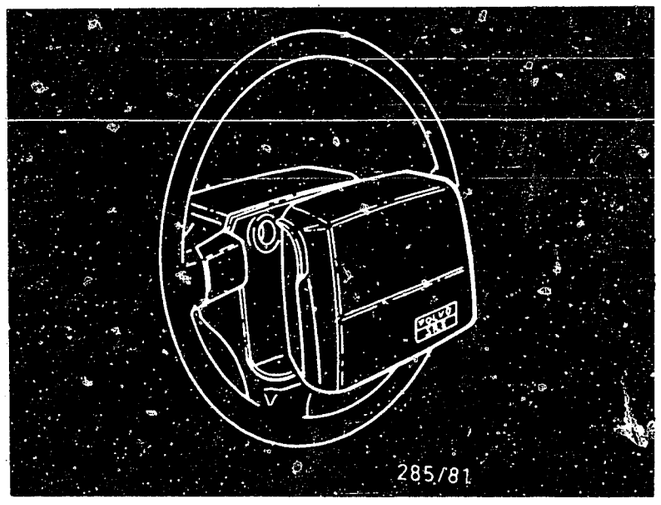
Remove airbag unit (see lower illustration).
Remove side panelling (see center illustration).
Using ohmmeter, test leads from triggering-device plug
term. 2 to term. 5
term. 8 to term. 5
term. 2 to term. 4
term. 8 to term. 4
for short circuit.

Eliminate short circuit in the leads.
Replace seat-belt-tightener unit and/or airbag unit.



Y

Return to self-diagnosis test table B11



TROUBLE-SHOOTING PROGRAM (1)

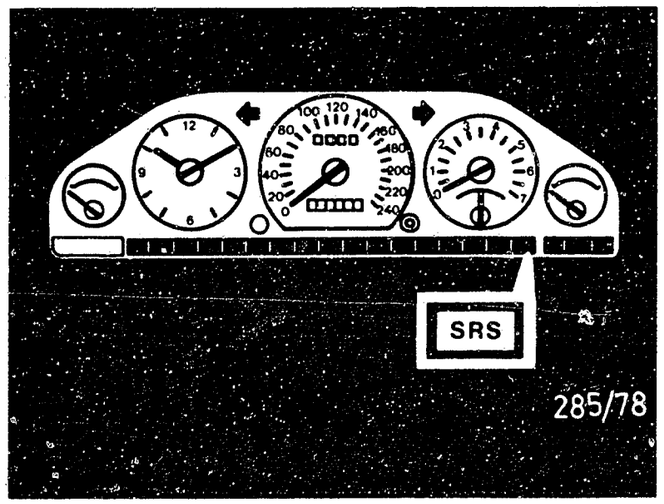
Remove instrument panel.
Test warning and diagnostic lamp.
Using ohmmeter at SRS/RS-warning-lamp base, test term. 15 to ground:
Set value: < 10 V

Is set value obtained?

N>

Using ohmmeter, check leads from SRS/RS-warning-lamp base to ignition lock and to lamp driver for short circuit and open circuit.
Eliminate short circuit and/or open circuit.
Replace SRS/RS warning lamp.

Replace instrument panel.



Y

Return to trouble-shooting chart B03

B23 ⟹

B24 ⟺

TROUBLE-SHOOTING PROGRAM (2)

Check transmission spring (contact roller) to firing pellet:
switch off ignition; disconnect battery term. 30.
Remove airbag unit.

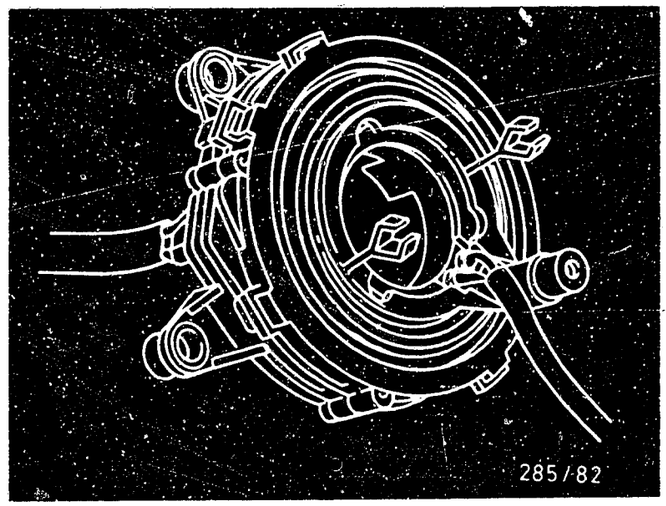
Check transmission spring (visual examination).

Transmission spring O.K.?

N> Replace transmission spring.

Y

Return to trouble-shooting chart B03



B25 — <==>

B26 — <==>

TROUBLE-SHOOTING PROGRAM (3)

Testing start detection term. 61:
Switch off ignition; disconnect battery term. 30.
Pull apart quadruple plug-in connection. Reconnect battery term. 30 and switch on ignition.
At quadruple plug-in connection (upper illustration), test term. 1 to term. 3:
Set value:
see brief instructions

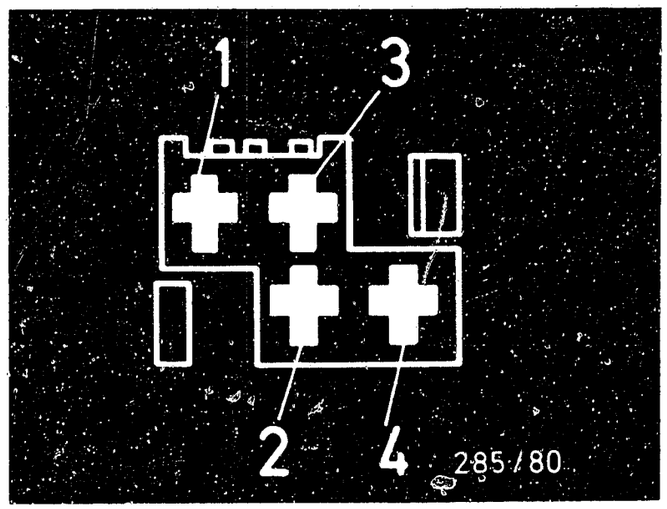
Is set value obtained?

N>

Switch off ignition.

Using ohmmeter, check lead from quadruple plug-in connection term. 1 to alternator term. 61 for short circuit and open circuit.

Eliminate short circuit and/or open circuit.



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TROUBLE-SHOOTING PROGRAM (4)

Testing voltage supply:

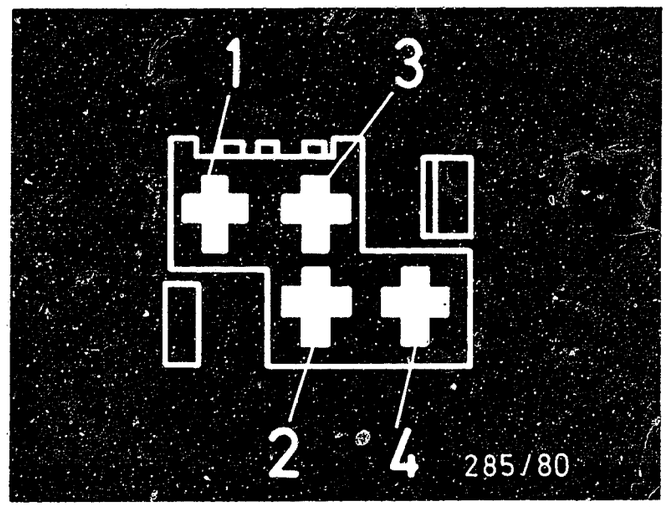
Switch off ignition; disconnect battery term. 30.
Pull apart quadruple plug-in connection. Reconnect battery term. 30 and switch on ignition.
At quadruple plug-in connection (upper illustration), test term. 2 to term. 3:
Set value:
see brief instructions

Is set value obtained?

N>

Switch off ignition.

Using ohmmeter, check lead from quadruple plug-in connection term. 2 to ignition lock term. 15 for short circuit and open circuit.
Eliminate short circuit and/or open circuit.



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C01 — <⟹>

C02 — <⟹>

TROUBLE-SHOOTING PROGRAM (5)

Testing activation lead to SRS/RS warning lamp:

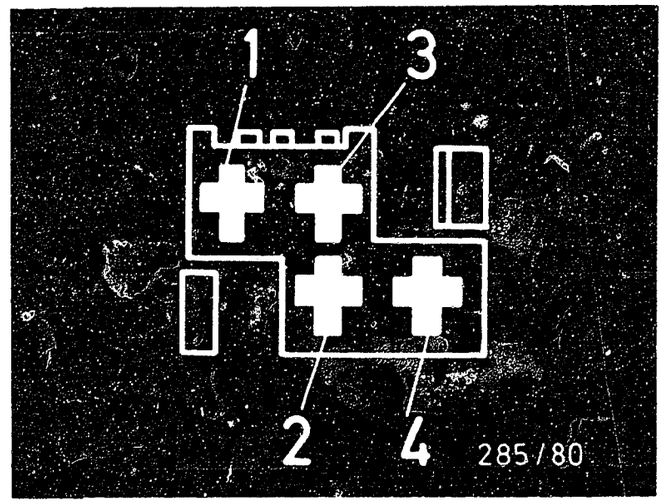
Switch off ignition; disconnect battery term. 31.
Pull apart quadruple plug-in connection. Reconnect battery term. 31 and switch on ignition.
At quadruple plug-in connection (upper illustration), test term. 4 to term. 3:
Set value:
see brief instructions

Is set value obtained?

N>

Switch off ignition.

Using ohmmeter, check lead from quadruple plug-in connection term. 4 via lamp driver to ignition lock term. 15 for short circuit and open circuit.
Eliminate short circuit and/or open circuit.
Replace instrument panel.



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C03 — <⟹>

C04 — <⟸

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